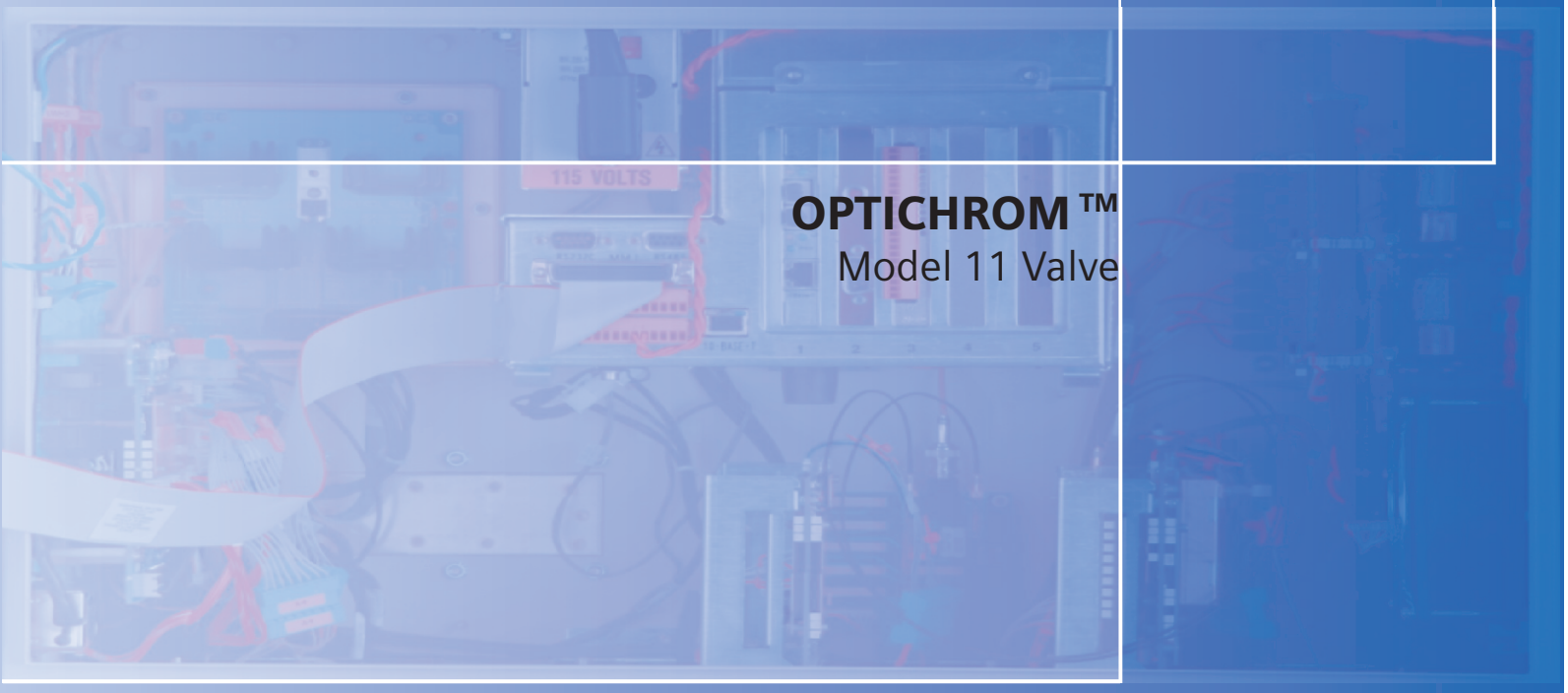
User's Manual Edition 1/2007



OPTICHROM™
Model 11 Valve

process
GAS CHROMATOGRAPHY

SIEMENS

SIEMENS

Optichrom®
Model 11 Valve

For Stock Numbers

2000627-002 External Loop, Stainless Steel
2000627-003 External Loop, Monel
2000627-004 External Loop, Hastelloy
2000627-005 Internal Loop (2 uL), Stainless Steel
2000627-006 Internal Loop (2 uL), Monel
2000627-007 Internal Loop (2 uL), Hastelloy
2000627-008 Internal Loop (5 uL), Stainless Steel
2000627-009 Internal Loop (5 uL), Monel
2000627-010 Internal Loop (5 uL), Hastelloy
2000627-011 Internal Loop, Stainless Steel, Flat Top Plungers
2000627-012 External Loop, Monel, Flat Top Plungers
2000627-013 External Loop, Hastelloy C, Flat Top Plungers
2000627-014 Internal Loop (2 uL), Stainless Steel, Flat Top Plungers

Revised Printing – January 2007

Repair Manual
M06115

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Safety Practices and Precautions

Safety First

This product has been designed and tested in accordance with IEC Publication 1010-1, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. This manual contains information and warnings which have to be followed by the user to ensure safe operation and to retain the product in a safe condition.

Terms in This Manual

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

Terms as Marked on Equipment

DANGER indicates a personal injury hazard immediately accessible as one reads the markings.

CAUTION indicates a personal injury hazard not immediately accessible as one reads the markings, or a hazard to property, including the equipment itself.

Symbols in This Manual

This system indicates where applicable cautionary or other information is to be found.

Symbols Marked on Equipment

DANGER - High voltage

Protective ground (earth) terminal

ATTENTION - Refer to Manual

Safety Practices and Precautions, Continued

Correct Operating Voltage

Before switching on the power, check that the operating voltage listed on the equipment agrees with the available line voltage. Ensure that the power supply switch is to the correct input voltage.

Danger Arising From Loss of Ground

Any interruption of the grounding conductor inside or outside the equipment or loose connection of the grounding conductor can result in a dangerous unit. Intentional interruption of the grounding conductor is not permitted.

Safe Equipment

If it is determined that the equipment cannot be operated safely, it should be taken out of operation and secured against unintentional usage.

Use the Proper Fuse

To avoid fire hazard, use only a fuse of the correct type, voltage rating and current rating as specified in the parts list for your product. Use of repaired fuses or short circuiting of the fuse switch is not permitted.

Safety Guidelines

DO NOT open the equipment to perform any adjustment, measurements, maintenance, parts replacement or repairs until all power supplies have been disconnected.

Only a properly trained technician should work on any equipment with power still applied.

When opening covers or removing parts, exercise extreme care "live parts or connections can be exposed".

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Chapter 1

Introduction

Overview

The Model 11 Valve Maintenance Manual has preventative maintenance, repair and test information for trained plant personnel who are responsible for in-plant maintenance of the Model 11 Chromatograph Valve.

In This Chapter

This Chapter covers the following topics:

Topic	Page
Capabilities and Applications	1
Functional Description	2
Filtering	2
Purging Below the Seal Disc	2

Capabilities and Applications

The Model 11 valve can be applied in process chromatographs as a liquid or vapor sample valve, column switching valve, or a column backflush valve. It provides the uniform sample volume, high reliability (500,000 cycle life on clean gas), low internal volume, and high speed (switching time in milliseconds) required by process chromatography. Plus it provides the added benefits of minimum wear (critical parts move only thousandths of an inch for switching), dependable reproducibility and simplified construction for easy maintenance. See Table 1-1 for detailed specifications.

The Model 11 valve body and cap are constructed so cleaning or replacement of sealing and cushion discs can be done without removing the valve from the chromatograph oven. Removal of three bolts allows access to the disc with no special tools required (see Chapter 4, Repair for detailed procedures). The specially constructed manifold eliminates leakage of air used for valve actuation. This feature is especially beneficial when bottled helium or nitrogen is used in place of instrument air.

Functional Description of the Model 11 Valve

The Model 11 valve is a 6-port, two-position, air-actuated valve. The six ports are arranged in a circular configuration as show in Figure 1-1.

Between each two ports is a plunger that opens or closes the passage between these two ports. A Teflon™ disc seals, prevents process fluids from contacting other components of the valve. This arrangement is shown in Figure 1-2. Six plungers operate in two sets of three. Each set of plungers is controlled by a spring-loaded, air-actuated piston so that one set closes three passages between ports as the other set opens three passages between ports. Passages between ports 1 and 6, ports 5 and 4, and ports 3 and 2 are normally closed. The other three passages between ports 1 and 2, ports 3 and 4, and ports 5 and 6 are normally open. The two operating positions of the valve are shown in Figures 1-2A and 1-2C.

The two actuating pistons are spring loaded in a manner that assures that all six passages are momentarily closed during the switching operation (both energized and de-energized). This feature prevents unwanted mixing of streams during the switching cycle. The plungers and disc move only a few thousandths of an inch to permit flow through the passages.

For external loop sample valve applications, ports 2 and 5 are connected externally by means of tubing as shown in Figure 1-1. The standard sample volume is 170 microliters.

For internal loop sample valve applications, ports 2 and 5 are connected internally by means of a machined passage in the valve cap as shown in Figure 1-3. The standard sample volumes are: 2 and 5 microliters.

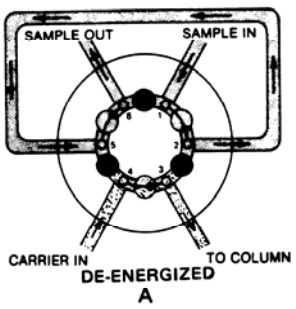
Filtering

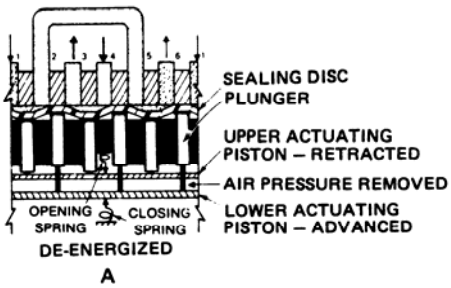
The Model 11 valve must be protected against dirt, filings, column packing material, or anything else that might affect the Teflon-to-metal seal. Filter elements should be 5 micrometer or finer.

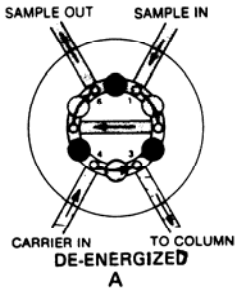
Purging Below the Seal Disc

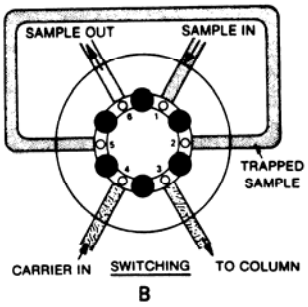
Purging below the seal disc area may be necessary in a trap valve, when permeation through the seal disc causes air peaks or in a sample valve, when corrosive gases attack the seal disc cushion and/or other valve parts. (In the latter case the expected mean time between failure can be increased significantly.)

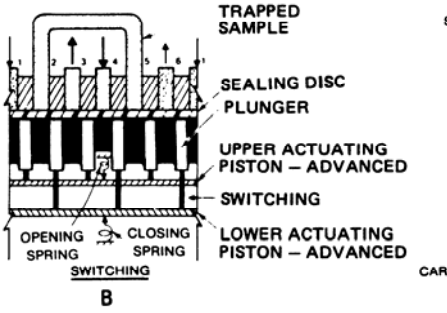
Purging is normally accomplished with the carrier gas. 1/16 tube fittings are provided as inlet and outlet connections for the purge gas. Typically a tee can be placed in the carrier inlet line and a needle valve can be used to regulate the flow at 5 cc/min.

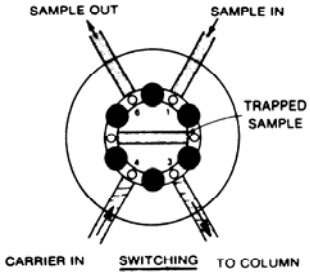


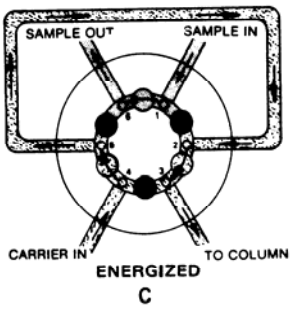


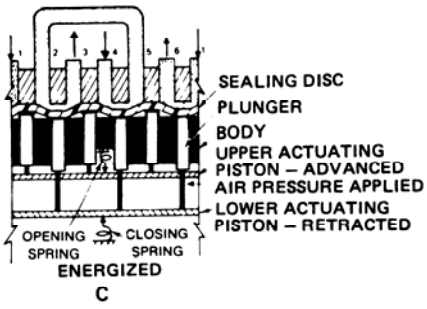


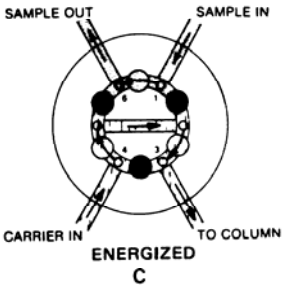












EXTERNAL SAMPLE LOOP
Figure 1-1

SECTIONAL VIEW
Figure 1-2

INTERNAL SAMPLE LOOP
Figure 1-3

Table 1-1: Model 11 Valve Specifications

Internal loop sample size:	2 and 5 microliters standard. Other sizes on special request.
External loop sample size:	15 microliters and larger. 170 microliters is standard.
Sample filter:	5 micrometer recommended (not furnished with valve).
Cap screw (33) Torque Setting:	35±1 inch pounds
Base Screw (12) Torque Setting:	6.5±1 inch pounds
Maximum operating temperature:	250°F (122°C) standard 15°F (66°C) 2000627-014
Maximum sample pressure:	Up to 300 psig (2068.4 kPa). Up to 60 psig (413.7 kPa) 2000627-014
Minimum sample pressure before it is necessary to apply vacuum assistance to lower chamber:	5 psig (34.5 kPa).
Maximum leak rate between ports:	Less than 1 microliter per minute.
Construction material in contact with sample:	316 stainless steel and Teflon, standard. Monel and Teflon, or Hastelloy and Teflon available on request.
Connection size and type:	1/16 in. O. D. tubing, with Swagelok® fittings.
Actuating air: (Lower port on manifold)	50 psig (345 kPa) instrument air standard. Helium or nitrogen may be substituted for air. 20 milliliters (at standard temperature and pressure) of actuating air required for each valve operation.
Lower Seal Disc Purge Gas: (Upper 2 ports on the manifold)	5 cc/min of carrier (normally helium).
Total switching time:	150 milliseconds (total time from initiation of command signal to completion of change in valve state).
Body size:	2.25 in. (57.2 mm) diameter by 3 in. (76.2 mm) height.
Mounting:	Clamp type.

Chapter 2

Troubleshooting

Description

The following tests can be made while the valve is in the analyzer. Testing may require analyzer shut down, depending on the installation. Valve ports will need to be disconnected.

Chapter Highlights

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Valve Leakage	5
Plugged Valve	6
Ruptured Sealing Disc	6
Slow or Erratic Switching	6

Valve Leakage

Vapor analyzers generally have the sample at atmospheric pressure, so any leakage would be from a carrier port to a sample port within the valve. With the sample inlet flow turned off, the sample outlet flow should be zero in either the “air off” or “air on” condition. Check for small leaks by immersing the sample outlet tubing in a beaker of water. Bubbles indicate internal leakage.

The liquid sample streams may have pressures several hundred pounds higher than the carrier gas. Leaking between ports will show up on the analyzer recorder as base-line shift when the sample pressure is removed from the valve.

Plugged Valve

Plungers in the valve are pressed upward by air or spring action, but when released depend on their own weight and sample pressure to drop them to the “open” position. Very small sample pressures--1 to 10 oz. (0.4 to 4.3 kPa)--may be insufficient to open the flow path if the sealing disc has been held against the cap for a long time (such as a valve in storage). Check flow across alternate flow paths--air on and air off. It may be necessary to temporarily increase the sample pressure to get the flow started and then reduce it to normal after a few cycles.

Ruptured Sealing Disc

To test for a ruptured sealing disc apply air to valve ports, one at a time, while sealing off all others. Place a small amount of soap solution such as Leak Tec™ over the upper control port’s bleed tube (see callout 24 on Figures 5-1 and 5-2). Any escaping air at this point indicates a ruptured disc. If this occurs, proceed with a disc replacement.

If the disc does not appear to be ruptured, remove the valve from service and proceed with a bench test as described in Section 3, Bench Test Procedures.

Slow or Erratic Switching

Excessive friction on the actuating pistons of the valve can be caused by lack of lubricant, or dirt or contamination on the O-rings. As a result, the valve may switch erratically, switch slowly or not switch at all. These conditions can cause a leak port to port (across the sealing disc), double sampling, or complete closing off of flow between two or more ports.

To correct poor switching conditions:

1. Disassemble the valve body.
2. Discard the old O-rings.
3. Thoroughly clean all the components.
4. Lubricate components.
5. Install new O-rings.
6. Reassemble the valve.

Chapter 3

Bench Test Procedures

Port-to-Port Leak Test

Description

Complete port-to-port leak test procedures are explained in this chapter. A complete test is recommended for a thorough check of the Model 11 valve; however, a short version of the test for either external loop or internal loop sample valves can be made by doing step 9 or 10 only. All tests shall be run with the valve assembled per specifications.

IMPORTANT

- The numbers in parenthesis in the following steps refer to similar numbered callouts on Figure 3-1, Test Stand Assembly.
- Figures 3-2, Test Flow Diagram, can help you visualize the flow at various ports when the actuating air switch (6) is operated.

Procedures

1. Connect a 100 psig (69 kPa) air supply to the test stand (see Figure 3-1).
2. Connect the actuating air (7) to the test valve (8).
3. Check port 1 to port 6 passage for leaks.
    a. Plug the end of the tubing from port 2 with a 1/16 in. Swagelok cap (3).
    b. Connect the sample air (9) to port 1.
    c. Slide an 8 in. [20.3 mm] piece of 1/16 in. I.D. Tygon tubing (11) over the ferrule on the tubing to port 6, and slightly submerge the open end of the tubing in a beaker (10) half full of water.
    d. Set the actuating air pressure regulator (5) to 50 psig [345 kPa], and set the sample air pressure regulator (12) to 100 psig [690 kPa].
    e. Turn the sample air switch (2) “ON” and check the end of the tube (11) submerged in the beaker (10). Bubbles forming at the end of the tube indicates a leak (refer to section 4 for repair procedures). If no bubble forms, continue with step f.

f. Turn the actuating air switch (6) “ON” and “OFF” several times while observing the end of the bubble tube (11) submerged in the beaker (10). In the “ON” position, bubbles should flow from the tube. In the “OFF” position, no bubbles should flow. Allow at least one minute for a bubble to form at the end of the tube. A bubble indicates a leak (refer to Section 4 for repair procedures). If no bubble forms, continue with step 4.

4. Check port 1 to port 2 passage for leaks:

   a. Remove the bubble tube (11) from tubing to port 6.

   b. Remove the Swagelok cap (3) from the tubing to port 2, and install it on the tubing to port 6.

   c. Slide the bubble tube (11) over the ferrule on the tubing to port 2, and slightly submerge the open end of the tube in a beaker (10) half full of water.

   d. Turn the actuating air switch (6) “ON” and “OFF” several times while observing the end of the bubble tube (11) submerged in the beaker (10). In the “OFF” position, bubbles should flow from the tube. In the “ON” position, no bubbles should flow. Allow at least one minute for a bubble to form at the end of the tube. A bubble indicates a leak (refer to Section 4 for repair procedure). If no bubble forms, continue with step 5.

5. Check port 3 to port 2 passage for leaks.

   a. Turn the sample air switch (2) “OFF”.

   b. Remove the sample air (9) from port 1, and connect it to port 3.

   c. Remove the Swagelok cap (3) from the tubing to port 6, and install it on the tubing to port 4.

   d. Leave the bubble tube (11) on the tubing to port 2, and slightly submerge the open end of the tube in a beaker (10) half full of water.

   e. Turn the sample air switch (2) “ON” and check the end of the bubble tube (11) submerged in the beaker (10). Bubbles from the end of the tube indicates a leak (refer to Section 4 for repair procedures). If no bubble forms, continue with step f.

f. Turn the actuating air switch (6) “ON” and “OFF” several times while observing the end of the bubble tube (11) submerged in the beaker (10). In the “ON” position, bubbles should flow from the tube. In the “OFF” position, no bubbles should flow. Allow at least one minute for a bubble to form at the end of the tube. A bubble indicates a leak (refer to Section 4 for repair procedures). If no bubble forms, continue with step 6.

6. Check port 3 to port 4 passage for leaks.

   a. Remove the bubble tube (11) from tubing to port 2.

   b. Remove the Swagelok cap (3) from the tubing to port 4, and install it on the tubing to port 2.

   c. Slide the bubble tube (11) over the ferrule on the tubing to port 4, and slightly submerge the open end of the tube in a beaker (10) half full of water.

   d. Turn the actuating air switch (6) “ON” and “OFF” several times while observing the end of the bubble tube (11) submerged in the beaker (10). In the “OFF” position, bubbles should flow from the tube. In the “ON” position, no bubbles should flow. Allow at least one minute for a bubble to form at the end of the tube. A bubble indicates a leak (refer to Section 4 for repair procedure). If no bubble forms, continue with step 7.

7. Check port 5 to port 4 passage for leaks.

   a. Turn the sample air switch (2) “OFF”.

   b. Remove the sample air (9) from port 3, and connect it to port 5.

   c. Remove the Swagelok cap (3) from the tubing to port 2, and install it on the tubing to port 6.

   d. Leave the bubble tube (11) on the tubing to port 4, and slightly submerge the open end of the tube in a beaker (10) half full of water.

   e. Turn the sample air switch (2) “ON” and check the end of the bubble tube (11) submerged in the beaker (10). Bubbles from the end of the tube indicate a leak (refer to Section 4 for repair procedures). If no bubble forms, continue with step f.

f. Turn the actuating air switch (6) “ON” and “OFF” several times while observing the end of the bubble tube (11) submerged in the beaker (10). In the “ON” position, bubbles should flow from the tube. In the “OFF” position, no bubbles should flow. Allow at least one minute for a bubble to form at the end of the tube. A bubble indicates a leak (refer to Section 4 for repair procedures). If no bubble forms, continue with step 8.

8. Check port 5 to port 6 passage for leaks.

   a. Remove the bubble tube (11) from the tubing to port 4.

   b. Remove the Swagelok cap (3) from the tubing to port 6, and install it on the tubing to port 4.

   c. Slide the bubble tube (11) over the ferrule on the tubing to port 6, and slightly submerge the open end of the tube in a beaker (10) half full of water.

   d. Turn the actuating air switch (6) “ON” and “OFF” several times while observing the end of the bubble tube (11) submerged in the beaker (10). In the “OFF” position, bubbles should flow from the tube. In the “ON” position, no bubbles should flow. Allow at least one minute for a bubble to form at the end of the tube. A bubble indicates a leak (refer to Section 4 for repair procedure).

   e. Turn the sample air switch (2) “OFF”.

   f. Remove the sample air (9) from port 5.

   g. Remove the bubble tube (11) from the tubing to port 6.

   h. Remove the Swagelok cap (3) from the tubing to port 4.

9. For valves with external loop caps only [stock no’s 2000627-002, 2000627-003, and 2000627-004], a shorter version of the test given in steps 3 through 8 can be performed by doing the following:

   a. Hook up the test stand and valve as described in steps 1 and 2.

   b. Connect the tubing from port 2 to the tubing from port 5 using a 1.16 in. Swagelok union.

   c. Plug the ends of the tubing from ports 6 and 3 with 1/16 in. Swagelok caps (3).

   d. Connect the sample air (9) to port 1.

e. Slide the bubble tube (11) over the ferrule on the tubing to port 4, and slightly submerge the open end of the tube in a beaker (10) half full of water.

f. Set the actuating air pressure regulator (5) to 50 psig [345 kPa], and set the sample air pressure regulator (12) to 100 psig [690 kPa].

g. Turn the sample air switch (2) “ON” and check the end of the tube (11) submerged in the beaker (10). Bubbles from the end of the tube indicate a leak (refer to Section 4 for repair procedures). If no bubble forms, continue with step h.

h. Turn the actuating air switch (6) “ON” while observing the end of the bubble tube (11) submerged in the beaker (10). When the loop between ports 2 and 5 is switched from the pressure side to the outlet side, a slug of air should escape from the bubble tube, then shut off completely. When the actuating air switch is turned “OFF”, switching the loop back to the pressure side, no air should escape. Bubbles forming at the end of the submerged tube indicate a leak (refer to Section 4 for repair procedures).

10. For valves with internal loop caps only [stock no’s 2000627-005, 2000627-006, 2000627-007, 2000627-008, 2000627-009, 2000627-010, and 2000627-014], a shorter version of the test given in steps 3 through 8 can be performed by doing the following:

    a. Hook up the test stand and valve as described in steps 1 and 2.

    b. Plug the ends of the tubing from ports 6 and 3 with 1/16 in. Swagelok caps (3).

    c. Connect the sample air (9) to port 1.

    d. Slide the bubble tube (11) over the ferrule on the tubing to port 4, and slightly submerge the open end of the tube in a beaker (10) half full of water.

    e. Set the actuating air pressure regulator (5) to 50 psig [345 kPa], and set the sample air pressure regulator (12) to 100 psig [690 kPa].

    f. Turn the sample air switch (2) “ON” and check the end of the tube (11) submerged in the beaker (10). Bubbles from the end of the tube indicate a leak (refer to Section 4 for repair procedures). If no bubble forms, continue with step g.

g. Turn the actuating air switch (6) “ON” while observing the end of the bubble tube (11) submerged in the beaker (10). When the internal loop between ports 2 and 5 is switched from the pressure side to the outlet side, a slug of air should escape from the bubble tube, then shut off completely. When the actuating air switch is turned “OFF”, switching the loop back to the pressure side, no air should escape. Bubbles forming at the end of the submerged tube indicate a leak (refer to Section 4 for repair procedures).

ITEM NO.	
1	SAMPLE AIR PRESSURE GAUGE 0-100 psig (0-695 kPa)
2	SAMPLE AIR SWITCH
3	1/16 in. SWAGELOK CAP
4	ACTUATING AIR PRESSURE GAUGE 0-60 psig (-414 kPa)
5	ACTUATING AIR PRESSURE REGULATOR
6	ACTUATING AIR SWITCH
7	ACTUATING AIR CONNECTION
8	MODEL 11 SAMPLE VALVE
9	SAMPLE AIR CONNECTION
10	BEAKER OF WATER
11	BUBBLE TUBE (TYGON)
12	SAMPLE AIR PRESSURE REGULATOR
13	ADAPTER TUBE

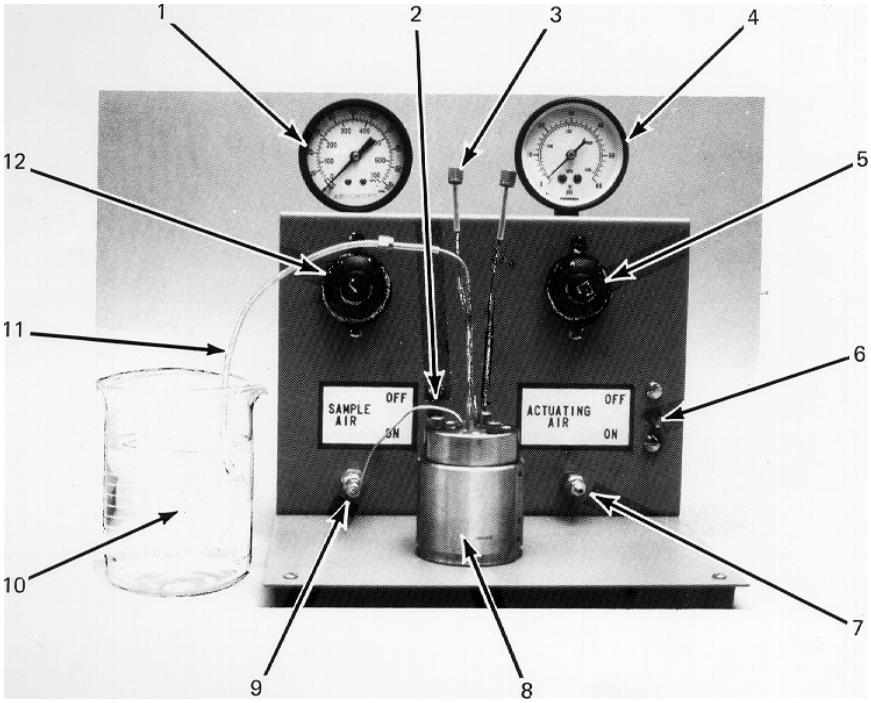

Figure 3-1: Model 11 Valve Test Stand Assembly (Stock No. V05000)

Port-to-Port Leak Test, Continued

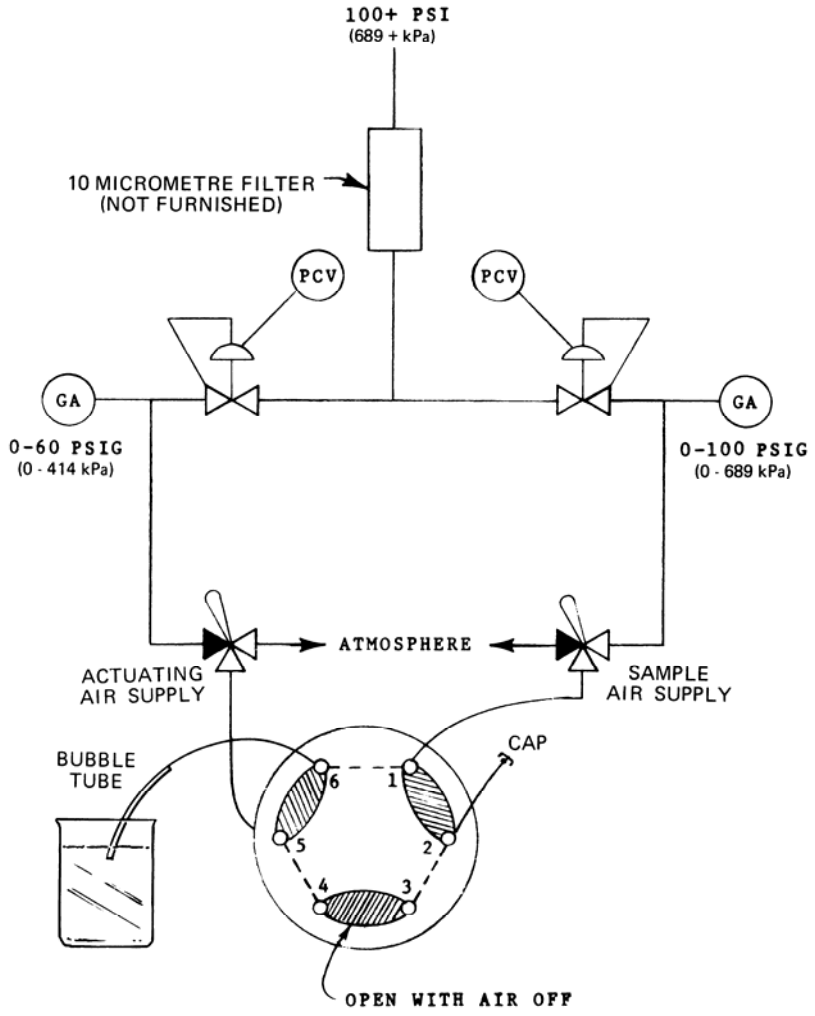

Figure 3-2: Model 11 Valve Test Flow Diagram

Chapter 4

Repair

Description

Under normal operating conditions the Model 11 valve will perform a minimum of 500,000 cycles without failure. However, contamination or abuse will drastically shorten the operating life of the valve. Process upsets, improper filtering, or improper maintenance procedures which introduce foreign material into the valve can cause component damage or complete valve failure.

When valve trouble is diagnosed to be port-to-port leakage, or low flow rate (plugging), the valve may be cleaned without disassembly. However, if the cause of trouble is not found, or is diagnosed to be a ruptured disc, proceed as outlined in the Disassembly and Inspection section.

Chapter Highlights

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Cleaning of Flow Passages

The valve must be cleaned if the trouble with the valve is leakage port-to-port, or if the valve fails to allow flow port-to-port when the passage is switched to open. The trouble may be dirt or contamination in the flow passages, or excess friction in the lower section of the valve.

Dirt and contamination may possibly be removed by the following methods:

1. Using a large syringe fitted with a tubing adapter, fill it with a cleaning fluid such as hexane, acetone, or methanol. Prepare a small beaker approximately half full of the fluid.

2. Connect the syringe to port 1 on the valve. Place Tygon tubing from port 2 into the beaker containing cleaning fluid. With the syringe, force cleaning fluid back and forth through the passage between port 1 and port 2.

3. Remove the Tygon tubing from port 2 and install it on port 6 and into the beaker. Apply actuating air to switch the valve. Use the syringe and force the cleaning fluid back and forth through the passage between port 1 and port 6. Remove actuating air pressure.

4. Attach the syringe to port 3 and place the Tygon tubing from port 4 into the beaker. With the syringe, force cleaning fluid back and forth through the passage between port 3 and port 4.

5. Place the Tygon tubing from port 2 into the beaker. Apply actuating air to switch the valve. Use the syringe to force the cleaning fluid back and forth through the passage between port 3 and port 2. Remove the actuating air.

6. Attach the syringe to port 5 and place the Tygon tubing from port 6 into the beaker. Use the syringe to force cleaning fluid back and forth through the passage between port 5 and port 6.

7. Place the Tygon tubing from port 4 into the beaker. Apply actuating air to switch the valve. Use the syringe to force the cleaning fluid back and forth through the passage between port 5 and port 4.

8. Bench test the valve to determine if the cleaning corrected the valve problem.

Disassembly and Inspection

The Model 11 valve can be disassembled and inspected by the following methods:

NOTE

- The numbers in parenthesis below refer to similarly numbered callouts on Figures 5-1 and 5-2.

Cap Disassembly

1. Relieve the pressure on the base screw (12) by turning it counterclockwise until it turns easily.

2. Remove the three socket head screws (33) and separate the cap (37) from the body (26).

3. Inspect the sealing disc (34) and cushion disc (35) for dirt or breaks.

4. If the discs are brittle or dirty, but not ruptured, or ruptured but clean, visually inspect the rest of the valve. If it is clean and in good order, install new discs and reassemble the cap (follow instructions given in subsection 4.5). If the valve actuating assembly is contaminated or malfunctioning, continue disassembly.

Body Disassembly

1-4 Same as steps given in Cap Disassembly.

5. Plungers (9 or 10) may be removed by inverting the valve base (26) and shaking it so that the plungers fall into the palm of your hand. If the plungers are stuck, delay removing them until after the pistons (18 and 21) are removed, then force them out from the bottom.

CAUTION

Do not allow the plungers (10) to fall into any hard surface because nicks can ruin them.

6. Remove the manifold (24).

7. Remove the retaining ring (13).

8. Remove the retainer base (14), compression plate (15), compression spring (16), and compensation plate (17) from the bottom of the valve body.

9. Remove pistons (18 and 21) with retaining ring pliers.

10. Inspect the interior of the valve body (26), the pistons (18 and 21), and the O-rings (19, 20 and 25) for contamination, odor, or mechanical wear.

Cleaning

The Model 11 valve can be cleaned by the following methods:

1. Clean the valve cap using a hypodermic syringe to force cleaning fluid back and forth through each of the tubes while keeping the cap submerged. A strong detergent solution, hexane, acetone, or methanol is satisfactory. An ultrasonic cleaner is a good aid for loosening particles in port holes.

CAUTION

Do not allow the polished face of the valve cap to rest on the bottom of an ultrasonic cleaner container or against any object in the container.

Rinse and shake out the tubes, then let the cap air dry before reassembly.

2. Wipe off grease and contamination from **all other valve parts** and clean as described in step 1 above.

CAUTION

Do not wash O-rings in hexane or other solvents.

Do not allow anything to rest on the top surface (polished surface) of the body while in the ultrasonic cleaner.

Allow the parts to air dry.

Reassembly

The Model 11 valve can be reassembled by the following methods:

NOTES

- All parts need to be clean before reassembly. Clean hands, clean tools, and a clean, dust-free area in which to work are recommended.

The numbers in parenthesis below refer to similarly numbered callouts on Figures 5-1 and 5-2.

Body Reassembly

1. If the valve body was disassembled, reassemble it by following the steps described below, and then proceed with the cap reassembly.

2. Apply a bead of KRYTOX 240 AC grease in both O-ring grooves of the spring-loaded piston (18). Install silicone O-rings (19 and 20), and apply grease to their outer surfaces.

3. Apply KRYTOX 240 AC grease to each of the six fingers of the finger spring on the air-loaded piston (21).

4. Place the air-loaded piston (21) over the small diameter of the spring-loaded piston (18) with the finger spring outside, and position with the guide pin. Apply a bead of KRYTOX 240 AC grease to the O-ring groove. Install silicone O-ring (19). Apply grease to the O-ring outer surface.

5. Apply a thin film of KRYTOX 240 AC grease to the inside of the valve body (26), where the pistons will be sliding.

6. Inset both pistons into the bottom of the cylinder. Use retaining ring pliers to position pistons with the guide pin in the hole of the body.

CAUTION

Be careful not to damage the O-rings when sliding them past the lower retaining ring groove.

7. Place the spring (16) on the compression plate (15). Apply KRYTOX 240 AC grease to the beveled cone of the compression plate (15), and insert the ball (28) into the greased cone. Insert both of these into the retainer base (14). Apply KRYTOX 240 AC grease to the base screw (12), and then screw it into the retainer base (14). Place the compensation plate (17) over the spring (16). Apply a thin film of KRYTOX 240 AC grease to the outside of the compensation plate (17) and inside of the retainer base (14) before final assembly.

8. Place the assembly containing the spring (16), compression plate (15), set screw (12), base (14), and compensation plate (17) in the valve body (26).

9. Reinstall the retaining ring (13).

10. Reinstall the manifold (24) with 3-o-rings (25).

Cap Reassembly

1. If the valve body was disassembled, reassemble it by following the steps given in the Body Reassembly section, then proceed with the cap reassembly as described below.

2. Place the valve body (26) on a clean surface with the two pins up.

3. Check to see if the plungers (9 or 10) protrude above the top surface of the body (26). If they do not, tighten the base screw (12) until the plungers protrude about 1/16 in. (1.6 mm). It is normal for three of the plungers to protrude slightly farther then the other three. Do not tighten the base screw beyond the point where the plungers rise readily.

4. Place one drop of KRYTOX 143 AY oil in the narrow space between each pair of plungers (9 or 10).

5. Using tweezers, move each plunger (9 or 10) up and down to lubricate it thoroughly. Leave any excess oil to be soaked up by the cushion disc (35).

6. Loosen the base screw (12) until the plungers no longer protrude above the top surface of the body (26). This is necessary to make sure that a plunger will not cut through the discs (34 and 35) when the valve is fully assembled.

7. Install the silicone rubber O-ring (31) in the groove surrounding the plungers (9 or 10). This O-ring is for static sealing, and it does not require a lubricant.

8. Pick up the cushion disc (35) and flick it with your fingers to remove any lint or dust particles. Position the cushion disc on the body over the plungers (9 or 10).

9. Pick up the seal disc (34) and clean it by sliding it between your index finger and middle finger. Make certain the disc is free of any oil or dirt. Place the seal disc over the cushion disc (35), and align both discs over the plungers (9 or 10).

10. Carefully align the cap (37) with the two guide pins on the body (26), and place the cap on the body.

11. Put the three cap screws (33) and six washers (32) into the cap, and tighten rotationally in the following sequence:

    a. Finger tight.
    b. 15-inch-pound (1.69 N•m).
    c. 35-inch pounds (3.95 N•m)

12. Adjust the base screw (12) to give proper spring compression by turning it clockwise to a torque setting of 6.5 inch-pounds (0.73 N•m).

Chapter 5

Drawings and Parts Lists

Description

This Chapter contains drawings and parts lists for the Model 11 valve. Table 5-1 lists complete valve assemblies and corresponding cap stock numbers.

An exploded view of the valve is used to identify its parts (see Figures 5-1 and 5-2). The numerical callouts on the drawings refers to item numbers on the same parts list (see Table 5-2). Also included are the related parts list for the Model 11 valve repair kit (see Table 5-3) and the tool and test kit (see Table 5-4). The repair kit contains items most commonly used to repair Model 11 valves, plus tools possibly difficult to obtain from other suppliers. The tool and test kit contains all items found in the repair kit (some in greater quantity), plus items for valve testing, useful common fittings and tools, and a few valve parts occasionally required.

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How to Order Parts

To order parts, the following procedure is recommended:

1. On the purchase order clearly state your company name, contact person, phone number, fax number, and order number or purchase authority.

2. Specify the mode of transportation you prefer for shipping parts.

3. Write out the quantity (and in parenthesis the number). Then identify the part with a description and complete stock number.

4. Identify the valve model number. For example:

   Purchase Order #12345

   Ship by Parcel Post:
   One (1) Seal Disc, Stock No. D40005
   Four (4) Cushion Disc, Stock No. D40000
   For Model 11 valve.

5. On the envelope in the lower left corner mark: EXPEDITE--PARTS ORDER.

6. Send the parts order to:

   Siemens Energy & Automation, Inc.
   408 US Highway 60
   Bartlesville, Oklahoma 74003

7. Or phone/fax in your order by calling:

   Tel: (800) 448-8224 (USA)
   Tel: 001 918-662-7030 (International)
   Fax: (918) 662-7482 (USA)
   Fax: 001 918-662-7482

8. Parts to be sent in for repair or returned for other reasons must also be identified with a pre-approved RETURN AUTHORIZATION number.

Drawing and Parts List, Continued

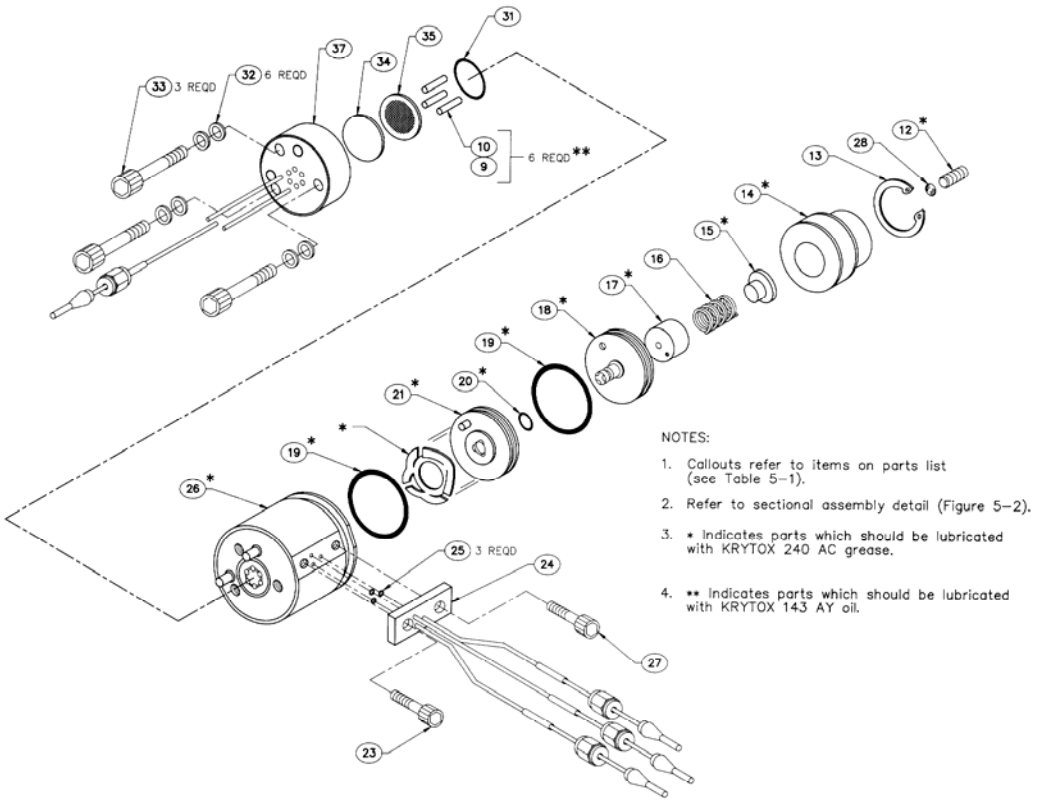

Figure 5-1: Model 11 Valve Assembly Detail Exploded View

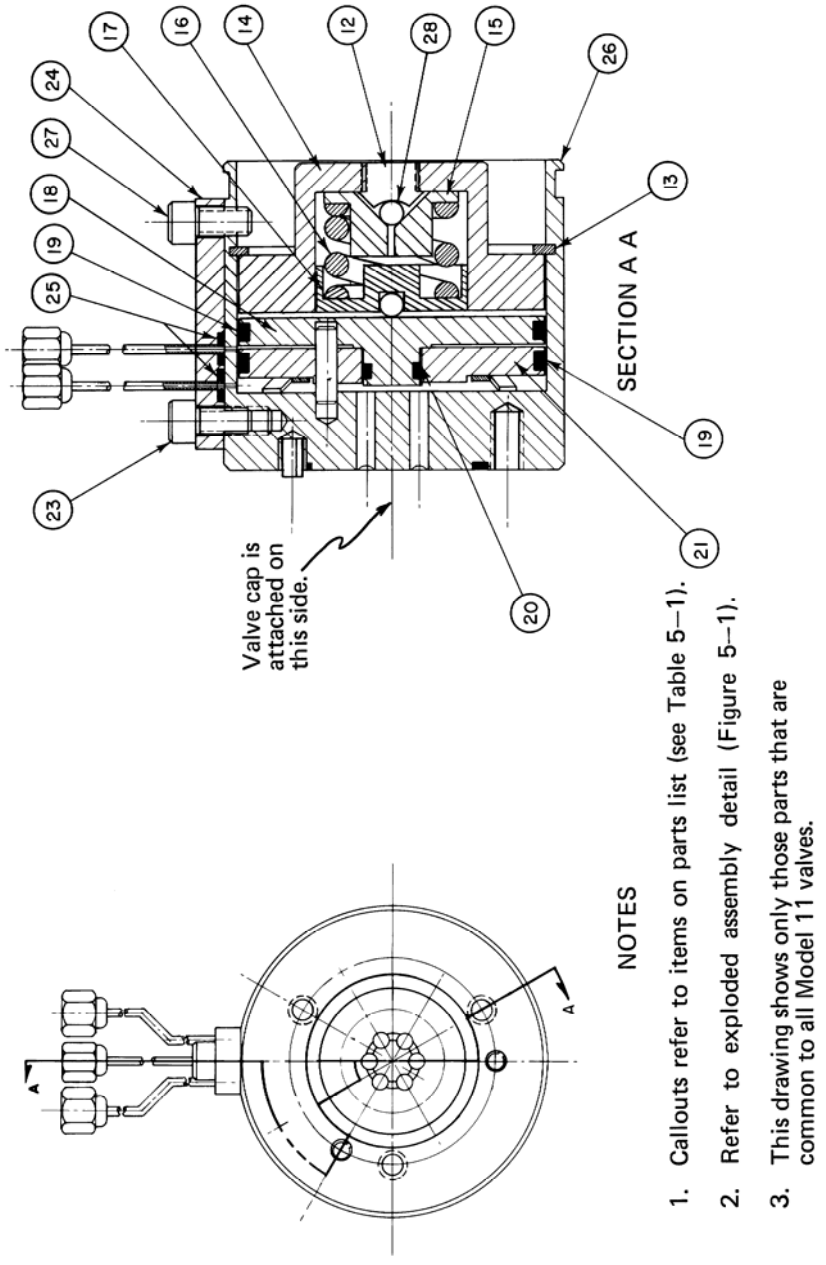

Figure 5-2: Model 11 Valve Assembly Without Cap Sectional View

Table 5-1: Model 11 Valve Stock Numbers

Complete Valve	Cap only	Description
2000627-002	C04200	External Loop Stainless Steel
2000627-003*	C04201*	External Loop Monel
2000627-004*	C04202*	External Loop Hastelloy “C”
2000627-005	C04206	2µl Internal Loop Stainless Steel
2000627-006*	C04207*	2µl Internal Loop Monel
2000627-007*	C04208*	2µl Internal Loop Hastelloy “C”
2000627-008	C04209	5µl Internal Loop Stainless Steel
2000627-009*	C04210*	5µl Internal Loop Monel
2000627-010*	C04211*	5µl Internal Loop Hastelloy “C”
2000627-011	C04200	External Loop Stainless Steel Flat Top Plungers
2000627-012*	C04201	External Loop Monel Flat Top Plungers
2000627-013*	C04202	External Loop Hastelloy C Flat Top Plungers
2000627-014	C04206	2µl Internal Loop Stainless Steel Flat Top Plungers
	C04221*	10µl Internal Loop Stainless Steel
	C04226*	20µl Internal Loop Stainless Steel

*(Special) Deliveries on these #’s may be longer than normal.

**Table 5-2: Parts List -
Model 11 LDV Valve**

ITEM	QTY	DESCRIPTION	STOCK NO.
1			
2			
3			
4			
5			
6			
7			
8		The following parts are used on all Model 11 valves:	
9***	6	PLUNGER, Valve, Flat Top	V16055
10	6	PLUNGER, Valve, Dish Top	P56705
11*	A/R	GREASE, KRYTOX 240 AC, 2 oz. (5.9 mL)	G87004
12	1	SET SCREW, Socket Head, Cup Point, 3/8-24 UNF-3A x 3/8" SST.	H10648
13	1	RING, Retaining, Model IX valve, Truarc N5000-200-S-MD	V16030
14	1	BASE, Retaining	B00065
15	1	PLATE, Compression	P49500
16	1	SPRING, Compression	S52000
17	1	PLATE, Compensation	P49510
18	1	PISTON, Spring Loaded	V16023
19	2	O-RING, Silicon Rubber, Size 2-133, 1.810" (46.0 mm) I.D., 0.100" (2.5 mm) W. Nom.	V16040
20	1	O-RING, Silicon Rubber, Size 2-133, 1.810" (46.0 mm) I.D., 0.100" (2.5 mm) W. Nom.	V16040
21	1	PISTON, 303 Air Loaded, SST. or equivalent, Model X valve	V16022
22**	A/R	OIL, KRYTOX 143 AY, 4 oz. (11.8 mL)	074995
23	1	SCREW, Cap Socket, #8-32 x ½" SST.	H09607
24	1	MANIFOLD, Air Signal	2000625-001
25	3	O-RING, Silicon Rubber, Size 4, 0.070" (1.8 mm) I.D., 0.070" (1.8 mm) W. Nom.	050247
26	1	BODY, Model 11 valve	2000626-001
27	1	SCREW, Cap Socket, #8-32 x 3/8" (.5 mm) Lg., SST	H09601
28	1	BALL, 5/32" (4.0 mm) Dia.	V16052
30			
31	1	O-RING, Silicon Rubber, Size 24	034024
32	6	WASHER, Spring, SST., 0.190" (4.8 mm) I.D., 0.375" (9.5 mm) O.D., 0.020" (0.5 mm) Th.	W10000
33	3	SCREW, Cap Socket, #10-32 x 7/8" (22.2 mm) Lg., SST.	H09614
34	1	DISC, Teflon Seal	D40005
35	1	DISC, Dacron, Cushion	D40000
37	-	See Table 5-1 for Various Cap #'s	

NOTES

*DuPont KRYTOX 240 AC grease is used to lubricate O-rings.
**DuPont KRYTOX 143 AY oil is used to lubricate plungers (item 9 and 10).
***See Table 5-1 where Item 9 is used.

Table 5-3: Repair Kit - Model 11 Valve Stock No. K21040

ITEM	QTY	DESCRIPTION	STOCK NO	Fig 5-1
1	10	O-RING, Silicone Rubber, Size 133	V16040	Item 19
2	5	O-RING, Silicone Rubber, Size 10	V16038	Item 20
3	4	O-RING, Silicone Rubber Size 4	050247	Item 25
4	10	DISC, Teflon, seal	D40005	Item 34
5	10	DISC, Dacro, Cushion	D40000	Item 35
6	1	GREASE, KRYTOX 240 AC, 2 oz. (5.9 mL)	G87004	Item 11
7	1	OIL, KRYTOX 143 AY, 4 oz. (11.8 mL)	074995	Item 22
8	1	WRENCH, Allen, 9/64” for #8-32 Screw	T10754	
9	1	WRENCH, Allen, 5/32” for #10-32 Screw	T10758	
10	1	WRENCH, Allen, 3/16” for 3/8” Base Screw	T10757	
11	1	PLIERS, Ret Ring	V16031	
12	1	SCREWDRIVER, Torque, Preset to 35 in. lbs	V05100	
13	5	O-RING, Silicone Rubber, Size 24	034024	Item 31
14	1	ADAPTER, ¼” Sq. Female Drive to 5/34” Hex	1631005-701	
15	1	SCREWDRIVER, Torque Limiting 6.5 in. lbs.	V05110	
16	1	BIT, Adapter, Torque Screwdriver to 3/16” Hex	T10691	
17	1	REPAIR MANUAL, Model 11 Valve	2000615-009	
18	1	BOX, Union Steel, #6316	B08025	
19	6	PLUNGER, Dish Top	P56705	Item 10
21	2	SCREW, Cap Socket, #8-32 x 3/8” SST.	H09601	Item 27
22	6	WASHER, Spring, SST., 0.190” (5 mm) I.D., 0.375” (10 mm) O.D., 0.020” (0.5 mm) Th.	W10000	Item 32
23	6	VALVE, Plunger, Flat Top	V16055	Item 9
24	2	BALLS, 5/32” (4.0 mm)n Dia.	V16052	Item 28

NOTE An optional part is the Model 11 Valve Test Stand Assembly (Stock No. V05000) shown in Figure 3-1.

Drawings and Parts List, Continued

Table 5-4: Tool and Test Kit - Model 11 Valve Stock No. K21041

ITEM	QTY	DESCRIPTION	STOCK NO.	TABLE 5-3 ITEMS	FIG 5-1 ITEMS
1	1	BOX, Union Steel, #6316	B08025	18	
2	2	FITTING, SST. Cap, 1/16T	F32601		
3	1	FITTING, SST, Ferrule-Back, 1/16T	F35701		
4	1	FITTING, SST, Ferrule-Front, 1/16T	F35901		
5	1	FITTING, SST, Nut, 1/16T	F36801		
6	1	FITTING, SST, Union, 1/16T	F39401		
7	1	GREASE, KRYTOX 240 AC, 2 oz. (5.9 ml)	G87004	6	11
8	4	SCREW, Sap Socket, #8-32 x 3/8", SST.	H09601	21	27
9	4	SCREW, Cap, Socket, #10-32 x 7/8" SST.	H09614	20	33
10	1	REPAIR MANUAL, Model 11 Valve	2000615-009	17	
11	5	O-RING, Silicone Rubber, Size 24	034024	13	31
12	1	OIL, KRYTOX 143 AY, 4 oz. (11.8 ml)	074995	7	22
13	2	SYRINGE, Plastic, B-D, Plastipak, 20 cc	S90000		
14					
15	1	SYRINGE, 10 cc, Glass, B-D, #2312	S90002		
16	1	SYRINGE, Plastic, B-D, #5570	S90005		
17	1	WRENCH, Allen, 9/64" for #8-32 Screw	T10754	8	
18	1	WRENCH, Allen, 5/32" for #10-32 Screw	T10758	9	
19	2	WRENCH, Open End, 5/16" x 1/4"	T10800		
20	3.75 ft*	TUBING, #316 SS, 1/16" O.D. x 0.015" Wall	T85995		
21	3 ft.**	TUBING, Tygon, 1/16" x 1/8" O.D.	T94000		
22	1	SCREWDRIVER, Torque Limiting, 35 in. lbs. (3.95 Nm)	V05100	12	
23	1	ADAPTER, 1/4" Sq. Female Drive to 5/32 in. Hex	1631005-701	14	
24	1	SCREWDRIVER, Torque Limiting 6.5 in. lbs.	1631005-001	15	
25	3	SPRING, Finger, 15/16" (23.8 mm) I.D., 1.550" (39.4 mm) O.D. Nom	V11100		
26	1	PLIERS, Retaining Ring	V16031	11	
27	3	SPRING, Compression	S52000		16
28	2	BALLS, 5/32" (4.0 MM) Dia.	V16052	24	28
29	5	O-RING, Silicone Rubber, Size 10	V16038	2	20
30	10	O-RING, Silicone Rubber, Size 133	V16040	1	19
31	6	WASHER, Spring, SST,	W10000	22	32
32	9	O-RING, Silicone Rubber, Size 4	050247	3	25
33	6	PLUNGER, Valve, Flat Top	V16055	23	9
34	6	PLUNGER, Valve, Dish Top	P56705	19	10
35	50	DISC, Teflon, Seal	D40005	4	34
36	50	DISC, Dacron, Cushion	D40000	5	35
37	1	WRENCH, Allen, 3/16" for 3/8" Base Screw	T10757	10	
38	2	VALVE, Syringe to Tubing	V14502		
39					
40					

Drawings and Parts List, Continued

ITEM	QTY	DESCRIPTION	STOCK NO.	TABLE 5-3 ITEMS	FIG 5-1 ITEMS
41	1	BIT, Adapter, Torque Screwdriver to 3/16" Hex	T10691	16	
42	1	PISTON, 303 air loaded, SST. or equivalent	V16022		21
43	1	PISTON, Spring Loaded	V16023		18

NOTE An optional part is the Model 11 Valve Test Stand Assembly (Stock No. V05000) shown in Figure 3-1.

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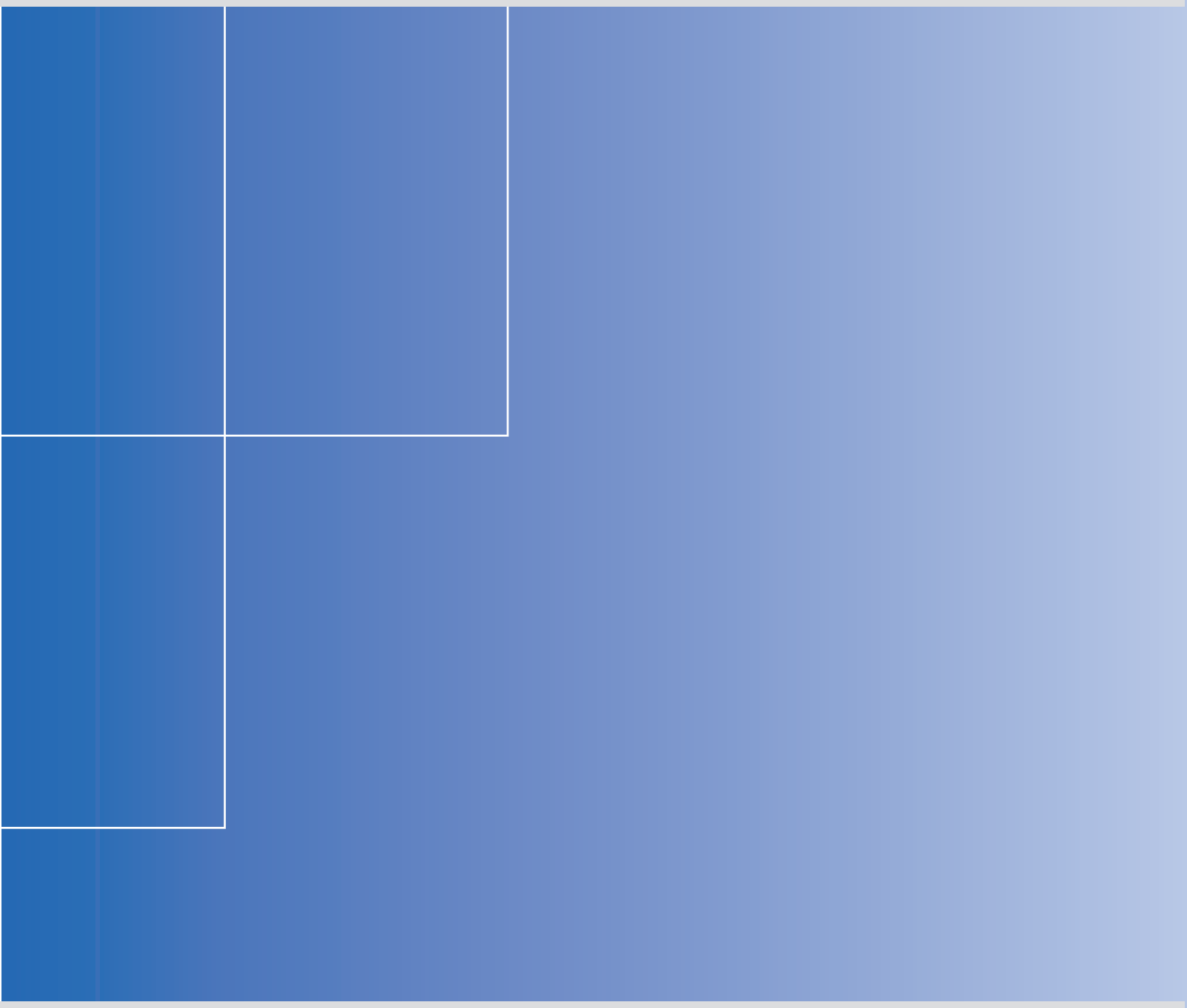

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